

The Builder.

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SEWERS are in,—if we may apply a current phrase; and it is quite time that they were. From one end of the kingdom to the other, the question of drainage is under discussion, and the best mode of effecting it is a subject of earnest inquiry. Size and form are the great points of debate. Large sewers rather than small (so as to admit a man at all times to repair or cleanse them, and provide for any possible amount of storm-water), have still some advocates, and the circular form in preference to the egg-shape, is still stoutly contended for by a respectable but diminishing minority. Our own opinion on both these questions is well known to our readers. For some years we have contended for smaller sewers than those in use, on the ground of increased efficiency and cheapness, and for the egg-shape as the best form: we claim a considerable share of the credit, indeed, of having led to a better understanding of the subject on the part of the public, and for having assisted in bringing about the (too late) adoption of improvements by the Westminster Commission. Good drainage is of the utmost consequence, if we would preserve the health, and improve the character of the people; and cheapness is of the utmost consequence if we would have good drainage. If good drainage could be had for nothing, an act of Parliament would scarcely be required to enforce it; lessening its cost is of course facilitating its adoption.

There are still many who do not fully comprehend the fatal effects produced on the animal system by the emanations from filthy depositories of decomposing matter, some few even who would advise the removal of old ladies, in a delicate state of health, to the proximity of a gully-hole as a healthful change; but the majority of the public are beginning to understand the facts of the case, and as they become acquainted with the present dreadful condition of the drains and sewers, to bestir themselves in obtaining an improvement. There is one point of inquiry which seems, however, scarcely to be taken into consideration by any, and that is the effect of bad drainage on food. "Imagine," says one of the witnesses before the Sanitary Commissioners, "a baker, with a cesspool in his yard in close company with a well, and a choked drain in his kitchen,—a combination by no means difficult to realize. The very heat of his oven brings a stream of poisonous atmosphere into his bakehouse, adding further contamination to every loaf that he has made. With the already poisoned water from the well behind. A butcher hard by an offensive gully-hole, finding his meat decompose much quicker than the weather warrants, and already unfit for human food, disposes of it at a tempting price to the poor. A brewer sinks a deep well, and drains his neighbours' wells and cesspools too,—a flavour something foreign to malt and hops may possibly result. The milkman ties up his cows in ill-drained, unventilated stalls, and wooders perhaps, that they become diseased, but retails his poisoned milk, nevertheless, somewhat more dearly for the loss. I once heard a milkman, under examination in court, when asked the

question whether he did not sometimes add a "leete" water to the milk he sold, boldly say, "Of course I do; the London stomach could not stand it pure." I have no doubt at all that he was right."

In respect of size and form, the Minutes of Evidence taken before the commissioners in question (to which we will now look without reference to those points which have excited so much ill-feeling in the minds of many individuals), contain the opinions of competent men on both sides, some of which our readers will probably be glad to see.

Confining ourselves at present to size;—Mr. Hertelet, clerk to the Westminster commission, when asked to give the result of his observations on this point, said:—

"I have been perfectly at a loss to conceive why such immense sewers should be built to carry off such mere threads of drainage. I have often thought, and have so stated in court, that the commissioners generally, from viewing only the main lines, have a very false impression as to the sizes required. I have seen sewers 5 feet 6 inches high by 3 feet wide, being built where, even during heavy rain, a 3 or 4-inch pipe would evidently have carried off all the water."

Mr. Phillips, who, as our readers know, is opposed to large sewers, being asked:—

"Would you make the size of all your sewers large enough for a man to pass through them? I should be obliged to do so under the present regulations of an intermittent supply of water; but if I had the control of a proper supply of water, as well as of the sewers, I could reduce the sizes of the sewers very considerably, because I should then be able to arrange them in combination with the water, so as to keep up a continuous current throughout them, and so keep them in proper action."

Then for the present brick sewers you would substitute tubular sewers?—For the branch sewers I would substitute small egg-shaped pipes, provided I could have a control over a supply of water."

When asked as to the possibility of reducing the size of sewers and drains to nearly one-third, by having a tubular system, he said:—

"As the velocity increases, so does the transverse section of the area occupied by the stream decrease.—[An important fact.]—This is a natural law observable in all moving streams, for we see that in a moving mass of water the discharge is the same, whatever form and size the channel may assume, the velocity being greater where the channel is narrow and deep, and less where it is wide, flat, and irregular; but the exact ratio of decrease of area, from decrease of friction and increase of flow, can only be determined by actual experiments, and by taking into account all the attendant circumstances which influence and govern the motion of the stream."

"Notwithstanding all the experiments that have been made by mathematicians and the data and formulae which they have deduced therefrom, we have not at the present time sufficient information from which to plan and work with confidence and accuracy in regard to sewerage. The facts that have come under my observation and experience show that theoretical writers on hydrodynamics are, in some degree, in error in supposing that the velocities and discharges of streams vary directly as the greater or less extent of the frictional surfaces in contact with them."

As to providing for an extremely violent discharge of rain, he says:—

"I am of opinion that it is unnecessary to proportion the sizes of the sewers to meet an extraordinary occurrence that may probably happen only once in so many years. My reason for not fearing any serious damage from an excess of rain at remote intervals being provided for in surface channels, excepting, perhaps, in situations peculiarly liable to inundation (for instance, at the foot of a long or steep declivity, or where the waters may, from any cause, be suddenly congregated at one focus) is, that I have observed, that in towns entirely

destitute of underground drains, no such inconvenience is felt as would justify the formation of enormously large sewers, or the expenditure of large sums of money to provide against it."

The witness exhibited drawings of some of the Westminster sewers, large enough for a man to walk in, shewing that the ordinary flow of water through them scarcely covers the bottom: an immense accumulation of deposit is the natural result. Courts, for which the use of sewers 5 feet 6 inches high and 3 feet wide had been insisted on, would be better drained, witness contended, by a drain-pipe 18 inches high. As to the size of pipes for gully drains, witness says pipes of 3, 4, and 5 in. diameter, laid properly, are, generally speaking, of ample size to carry off the surface water of the streets: in some situations, however, larger pipes would be desirable.

Mr. Joseph Gwilt, as one of the surveyors of the Lambeth district of sewers, contends for large drains. He was prepared to deny that "the smaller the size of the drain, within certain limits, the better the run and the less the deposit." To the remark:—

"It is estimated that a supply of water for the whole of the metropolis, supposing each house to have a supply of 125 gallons per diem, or 25 gallons per head, would be given by a circular tunnel or aqueduct of 123 feet diameter. There are in the Kent and Surrey district 55,000 houses, and the supply there would be given by an aqueduct of proportionate size to your number of houses, that is, one-fourth. Such being estimated to be the size of conduits required to bring in water, the sectional areas of the drains and sewers, it is presumed, would not be required of vastly greater size, supposing them to have as good a fall, to carry away that same water. Can you prove any addition of rain water, or even of extraordinary storm water, requiring a system of drainage, of a sectional area more than five times that of the Thames at Waterloo Bridge at high-water, or nearly a thousand times the area of the aqueduct that would furnish the whole supply of water to the metropolis? He replied, I apprehend in providing drains for a house you are to provide against accidents. Therefore I should say it would be prudent always to have drains larger than are actually necessary to guard against stoppages. A stoppage in a small drain stops up the whole orifice: a stoppage in a large one is partial. There may be, most likely, a means of its running off in some way or other.

Do you dispute the fact that a 4-inch drain from a house keeps clearer than a 9-inch, and is clearer still than a 12-inch?—I certainly do dispute it.

The thing which you deprecate is the stoppage of a drain?—Yes."

He thought it most desirable that drains should be sufficiently large to afford the means of cleansing them.

Mr. E. P. Anson, another of the surveyors of the Lambeth district, also favours large sewers.

"Supposing an occupier is desirous of draining his house into a sewer, what sized drain do you require him to put in?—We have hitherto required 10-inch and 12-inch barrel drains; but the question is now under consideration, whether, by adopting glazed tubes, we may not reduce that to 9-inch.

Is that the size you would stop at?—I am not prepared to say that. The Commissioners have resolved to adopt glazed tubes, but we have not definitively settled the size.

Have you recently been to the Westminster sewers, and seen what they have in use?—I went there about a fortnight ago.

Were you not satisfied that smaller drains than you had been accustomed to use were desirable?—Only desirable on account of the expense.

Not on account of any thing in regard to the flow?—I think not.

You still think that a 12-inch drain would be a good size to discharge the flow from houses?—I do.

Will you state the grounds for that opinion?